DOCUMENT RESUME

ED 089 196 CS 000 958

AUTHOR Stanchfield, Jo M.
TITLE The Teacher's Role in Educational Technology.
PUB DATE May 74
NOTE 16p.; Paper presented at the Annual Meeting of the International Reading Association (19th, New Orleans, May 1-4, 1974)

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS *Computer Assisted Instruction; *Educational Technology; *Instructional Media; Instructional Technology; Reading; Reading Improvement; *Reading Instruction; Reading Programs; Teacher Education; Teacher Influence; *Teacher Role; Teaching Styles; Technological Advancement

ABSTRACT

This paper discusses some of the roles that teachers play as technology affects the course of education. The contents include: (1) a general discussion of the role of the teacher in relation to the role of technology in education; (2) a discussion of factors affecting the teacher's role, which looks at teacher education and the lack of training provided in the use of educational technology, staff development and how retraining teachers in various aspects of technology can be accomplished, and school district size and how the forming of larger school districts could provide more funds for the use of computers in both instruction and administration; (3) variability of the teacher's role, which discusses the various uses of technological devices in reading instruction; (4) innovative roles of the teacher in current experimental programs, which discusses computerized language experience programs, computerized reading instruction in the secondary school, and teletype-news service systems in reading instruction. (WR)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY
Jo M. Stanchfield

TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER."

ED 089196

THE TEACHER'S ROLE IN EDUCATIONAL TECHNOLOGY

Jo M. Stanchfield

Within the last fifty years, technology has made more progress than could have been envisioned one hundred years ago. Today it affects nearly every aspect of our lives, so it is inevitable that it should make its mark on education. Although the Industrial Revolution occurred over two hundred years ago, technology has materialized in education only in the last twenty years.

In these twenty years we have seen a variety of technical devices -- from audio-visual equipment to computers -- developed or adapted for educational purposes. As the age of technology advances, its impact upon the educational system becomes increasingly apparent. While there are many areas in which this impact is felt, its effect upon the role of the teacher is of primary concern to educators. Will the machine replace the teacher? Will technology dehumanize education by "increasing the assembly-line aspects of school life, reducing the integrity of the live teacher and thus subtly altering the social character of the learning process?" (1) To date there has been no significant research on the psychological consequences of educational technology, particularly with the use of computers or related teaching machines, and there is no reason to presume that the teaching machine will ever replace the human teacher. However, to adequately assess the function of technology in the educational process, we cannot define its role without discussing the role of the teacher. Unquestionably the latter will be altered. Technology, rather than supplanting the teacher in the classroom, will supplement him in the teaching/learning process. Whether or not technology will benefit education depends almost entirely on the teacher, for he is the one who will decide its use in the classroom.

CS 000 958

It is generally conceded that many of the machine's non-human qualities are advantageous. A machine is a tireless, objective, infinitely patient, non-punitive and non-judgmental instructor, and therefore does not demoralize the student or create any negative self-fulfilling prophecies. Machines can free teachers from tedious jobs such as scoring tests and conducting drills, and because they are tireless, can probably do these jobs more efficiently. Thus teachers are free to diagnose, evaluate, and spend more time with students in small groups or on an individual basis. While part of the class drills with the machines, the rest can be in discussion groups with the teacher. This kind of approach divides the responsibility of teaching.

In addition to relieving the teacher from routine tasks, the media can also present information to the students. Here, too, the responsibility of teaching is divided. Through films, instructional television, and video tape, this can be done on a mass level, the teacher supplementing the information with discussions in which students are given the chance to express themselves and to learn from the human contacts of teacher and peers. On an individual level, computer-assisted instruction (CAI) or tapes would be used.

Media can also be used on a supplementary level to illustrate more vividly the information that the teacher presents. Drill work can also be supplementary. Here the student will be able to practice more efficiently what he has learned from the teacher.

The quality of the programs for machines is extremely important, because the program contains the information conveyed to the students. It must be clear, logical, and presented in a stimulating manner. The teacher should preview the material to see whether or not it is suitable, before presenting it to the class. In some instances, particularly tutorial, the teacher may design his own programs according to his students' individual needs.

Oettinger cites the following as teacher-functions in the individually

prescribed curriculum. (2)

1. Diagnose pupil strengths and weaknesses
   a. background data
   b. placement test results
   c. pre-test results
2. Write initial prescription including:
   a. instructional tasks
      (1) self-instructional work pages or
      (2) manipulative devices or
      (3) group instruction or
      (4) tutoring
   b. testing
3. Analyze student progress through a study of:
   a. worksheets completed
   b. time spent
   c. testing results
4. Give guidance
   a. explain directions for materials
   b. read directions for non-readers
   c. assign teacher tutoring
   d. assign group instruction
   e. encourage peer tutoring
   f. conduct large group evaluations
   g. give oral checks
5. Write next prescription
6. Administer test
   a. supervise unit and post tests
   b. administer oral portions of test
7. Analyze results

Although technology can share in the responsibility of teaching, it cannot replace the human teacher. Machines cannot have discussions with students, and discussion is a vital part of the educational process. It enables the student to voice his ideas and receive feedback from his peers and his teacher. This group atmosphere provides a variety of opinions and a chance to learn how to interact with others. The structured setting of the classroom teaches responsibility and discipline, for students must follow certain rules of conduct in order to achieve their goals and be accepted. This is an extremely vital part of the learning process and cannot be supervised by a machine.

It is for this reason that "teachers must be sure technology is used in accordance with the human values of learning and teaching." (3) To insure this, the teacher must evaluate the relationships that occur during instruction and control the media so that it doesn't destroy the human aspect of learning. He

should be able to "manage the education process so as to produce the maximum amount of learning for effort expended, by bringing to bear every possible resource at his command, including instructional media if they seem appropriate for meeting educational objectives." (4)

FACTORS AFFECTING THE TEACHER'S ROLE

Teacher Education

Most colleges and universities today use technological devices, including computers, in administration and instruction. However, few institutions actually train students to teach with the newer and more complex media. For economic reasons, only the larger or more affluent institutions offer training in the use of technological equipment or in programming for computer-assisted instruction. As a result, many teachers have ignored or resisted the use of machines primarily because they do not know how to use them.

Staff Development

Most teachers readily become "converted" to the use of instructional machines once they have used them and feel secure in their use. Retraining teachers in various aspects of technology can be accomplished through staff development. In-service training programs would acquaint teachers with the broad potential of technological instruction, train them to operate various devices and machines, and help them to adapt technology most effectively in individual classroom situations. Fine suggests that a desirable approach would be to offer courses on teaching machines in programmed form. "If teachers learned about the new educational psychology through its own techniques, they would be better equipped to teach it to their students." (5)

Another area of staff development is that of training in the programming skills and planning techniques needed to develop and maintain programs for computer-assisted instruction. Dyer points out that the large scale intro-

duction of CAI would create a demand for specialists with a background of teaching experience and qualifications for defining, developing and implementing, testing, and maintaining the CAI facilities. (6) Since such a person would ideally be qualified as a classroom teacher, this opportunity for specialization presents a new aspect of the teacher's role.

School District Size

For the past twenty-five years, the trend in school district organization has been one of unification and consolidation. The number of independent school districts has decreased from 106,000 to approximately 19,000 in 1971. However, despite this reorganization, "only one-fourth of all children are enrolled in school systems which enroll as many as 25,000 or more children" and "an equal one-fourth of all children are attending schools in districts enrolling fewer than 3,000 children." (7)

Research over the past twenty years has revealed a positive relationship between school size and such factors as educational cost, breadth of educational program, and professional staff qualifications. (8) Thus the formation of larger districts should expand the implementation of educational technology. Because of the high cost of CAI, the forming of larger school districts would provide more funds for the use of computers in both instruction and administration.

In 1970, the NEA Research Division conducted a survey of public school teachers to determine the extent of usage of computer-assisted instruction in the United States. Results of the survey showed that teachers in schools of 3,000 or more pupils were more involved in CAI than teachers in smaller systems. (9) Thus it can be assumed that the benefits of sophisticated technology such as ITV or CAI are beyond the financial reach of all but the larger school districts. Research conducted by the Committee on Economic Development indicated that in 1968 the cost for one hour per day per student for drill and prac-

tice on a computer would be $27.2 million in a 100,000-pupil district. (With rapidly increasing inflation, it is impossible to up-date this figure accurately.) The smaller the district, the higher the cost per student per CAI hour. In comparing three different sizes of school districts, the cost per student per CAI hour of drill and practice would, at 1968 figures, be $2.27 in a 10,000-pupil district, $1.81 in a 100,000-pupil district, and $1.77 in a 500,000-pupil district. (10)

The CED study further noted that "high costs do not necessarily make inevitable abandonment of a promising technology for purposes of instruction. ... It is apparent that federal support for the development of CAI materials and investments by the computer industry will be necessary to produce the needed software and hardware." (11) However, McCusker and Sorensen remind educators that education policy making (and revenue raising) is highly decentralized. (12)

> Even though a decreasing proportion of money for public education comes from local sources, both policy and fiscal control remain primarily local. While it may be possible to develop a sort of "national view" of instructional technology and its place in education, the fact of local control seems to assure that there will continue to be a great deal of variability around a any central tendency that can be described.

VARIABILITY OF THE TEACHER'S ROLE

During the school year 1972-73, the writer visited eleven school districts to study the various uses of technological devices in reading instruction. Four organizations or patterns of usage were observed in which the teacher assumed varying roles.

In one type of program, technological devices were used as a supplementary aid in the classroom. These aids included overhead transparencies, slides, filmstrips, listening tapes, closed circuit television, and video tapes. The teacher's task involved planning the presentations, scheduling

the material, and operating the equipment. In some schools CAI was used to help analyze test data and schedule students. In these circumstances the teacher used software (worksheets) and functioned in the capacity of a director of learning and a guidance counselor.

The most common use of machine technology was found in districts using various types of hardware. Children were scheduled for a part of the school day with a special teacher in a room containing teaching machines. Here they worked under the teacher's direction on specific vocabulary or comprehension skills. In these instances, the teacher's function related to that of a supervisor, guide, or manager. This organizational structure required consistent communication between the regular classroom teacher and the special teacher using the technological equipment. Divided responsibility without consistency, sequence, and continuity could result in a fragmented approach to improving students' reading achievement.

A third structured organization for the use of tencnology was found in the "media center" - a classroom equipped with all forms of technical media, including filmstrip projectors, movie projectors, audio tapes, video tapes, a language master, cassettes, and a computerized teaching machine. Usually the media center also contained a variety of game activities, programmed learning workbooks, and books. The teacher in charge of the center supervised groups of children at scheduled times and assigned them to different tasks. The teacher also, in some instances, facilitated the uce of audio-visual equipment with the classroom teacher and disseminated information about current filmstrips, slides, and movies. Here, the teacher's role was similar to that of a coordinator and consultant.

The fourth area of utilization for CAI was found in experimental programs in secondary and continuation schools. Students referred to these programs were in need of extensive individual help to overcome educational defi-

ciencies. Computerized teaching proved highly successful in this area because of its effectiveness as a motivator and an attender. Most of the instruction in such programs was individualized and students worked at their own level and pace. The teacher evaluated learning needs, provided special individual assistance, counseled students, and prepared programs for the computer.

INNOVATIVE ROLES OF THE TEACHER IN CURRENT EXPERIMENTAL PROGRAMS

An inherent difficulty in the context of reading programs in technology is that they tend to be dull, repetitious, and boring for children. Here, the role of the teacher in motivating learners becomes a difficult and challenging one. This challenge is being met successfully in many of the new experimental programs that have been implemented throughout the country.

Computerized Language Experience Programs

Encouraging results have been reported in Florida for a special beginning and remedial reading experiment in which machines and computers were used with a unique language experience approach. This project involved fifth and sixth grade students in the grammar schools of a rural disadvantaged district. Because of the low economic level in the area, the functions and goals of the program were not limited to reading improvement. Disadvantages in life style, social status, and speech were also of concern.

In this innovative teaching/learning process, a student dictated into a standard type of dictating machine, similar to those used by business executives. Overnight, the material was punched on cards and fed into a computer. The following day, a printout of the story was returned, together with an alphabetical list of all the words used. Each word was keyed to the line in which it appeared so the student could use context clues if he could not recognize the word by itself. As he read his own story, he heard a voice copy dictated by the teacher. Thus he learned to associate words and meaning through simultaneous aural and visual experiences. Learning was further expanded through re-

lated activities, including oral reading, listening, word attack, drill, and kinesthetic experiences.

The computer kept track of various areas of the student's learning and supplied information on individual programs. With this data, the teacher could readily diagnose learning needs and plan prescriptive measures.

While the program has great promise for teaching the disadvantaged, in beginning reading it is just as applicable to children of advantaged background. Other potential uses are in the education of adult illiterates or of segments of the population limited by language barriers. The director of the computing center associated with the project stated, "The computer is the behind-the-scenes tool to help any people with a limited culture expand their vocabulary."(13)

In another Florida study, concepts and methods of the computerized language experience approach were combined with an interdisciplinary approach to teaching poor readers at the secondary level. This method involved utilizing subject matter as well as personal experiences in structuring experiences for dictation.

Reporting on a preliminary study to determine feasibility of a pilot project, Williams outlined the development of a program to improve reading skills, academic achievement, and self attitudes of low-achieving, disadvantaged secondary students. The program involved English, social studies, and science teachers in team planning and implementation. The teachers met weekly to plan concrete, discipline-centered activities such as laboratory experiments, field trips, films, and other projects which "all provide a sensory base, yet... stimulate conceptual thinking leading to abstract levels within different students." (14)

Through dictation procedures of the computerized program, eighth and ninth graders produced student-authored reading texts based on their own classroom experiences. Their material was transcribed into computer input,

where the vocabulary was structured, alphabetized, merged into previous material, and recorded. As in the elementary program printouts included a list of words keyed by line number to the printed context. Study procedures were also similar to the model program, in that the students used oral, visual, aural, and kinesthetic techniques in their reading lessons.

In comparing various methods for teaching reading at the secondary level, the researcher concluded that the interdisciplinary approach combined with computerized language experience incorporated most of the strengths of other methods while avoiding many of their weaknesses. He cited factors essential to reading instruction at the secondary level. It must "be centered around the subject matter or discipline areas. It must begin at the student's instructional level, incorporate study habits pertinent to the subject matter, involve vocabulary and reading styles appropriate to the discipline, and preferably taught by the content area teachers." (15) All of these factors were inherent in the experimental approach under investigation. The researcher anticipated that this method would also help to solve such problems as determination of student instructional levels, extensive vocabulary testing, and teacher resistance created by self-felt inadequacies.

Computerized Reading Instruction in the Secondary School

California educators are also enthusiastic about the success of CAI in secondary schools. In Los Angeles, students in three junior high schools and three senior high schools participated in a program designed to help cure chronic educational needs. At each of the six schools, an average of 500 students used the computer equipment every day. Approximately 80% of the total computer time was devoted to remedial exercises, the remaining 20% was for enrichment exercises and general problem-solving. Programs are available in language arts, English, and mathematics.

A typical computerized lesson in language arts might include instruc-

tion in capitalization, punctuation, sentence structure, word meaning, contractions, or possessives. The lessons were designed to supplement normal classroom work and were oriented to the students' needs and capabilities. In addition to drill and practice experiences, many students used the computer as a problem solving supplement in classes such as algebra, physics, and chemistry. Some students received instruction in programming and learned to develop their own programs.

Another program of computerized reading instruction was used experimentally in continuation education. In this program, basic education was provided for 16-18 year-olds who were employed or who, for other reasons, could not be educated successfully in the regular high school program. In this continuation high school, computer-assisted instruction proved to be highly effective in helping teachers motivate students to stay in school and to improve their academic achievement.

The program was strongly success-oriented. It was also individualized and designed to help meet the personal needs of the students. Computer instruction, programmed by the teachers themselves, was an important part of the teaching/learning process. CAI was available in three subjects: reading, health, and driver education. Reading lessons included both vocabulary and comprehension skills. For example, students learned such word analysis skills as consonant substitution with phonograms, contractions, compound words and syllabication. In comprehension, they selected main ideas and determined the sequence of events. After a student completed the computerized lesson or "run", the teacher examined the printout, checked errors, and retaught unlearned concepts. The flexibility of the system accommodated to individual differences and permitted each student to progress at his own level and pace.

Teachers in both the regular and continuation program cited the following advantages of CAI in teaching at the secondary level:

1. The computer program provided drill and practice, reinforcement,

and specific physical involvement. The lessons taught students to follow directions, to be precise, and to check errors.

2. The computerized approach was keenly motivating. Students shared the status of technology in our society. They also enjoyed the novel "human touch" of being addressed by name by an impersonal machine.
3. Computerized instruction proved to be an effective instrument in helping students attend. Students were more alert and able to attend for thirty or forty minutes, as compared to ten or fifteen minutes in class.
4. To the students, computers seemed to be non-threatening. The tireless machines tolerated mistakes and repetition without human reactions of impatience or irritation.

Teletype-News Service Systems in Reading Instruction

Most current experimental programs in technological education use new and sophisticated devices that were designed to revolutionize traditional methods of instruction. However, one of the most interesting of these programs involves the use of technological equipment that is neither new nor revolutionary, but its application to reading instruction is fresh, relevant, and exciting. The teaching machine is a teletypewriter; the program is a stream of words that brings up-to-the-minute news into the school or reading center, direct from an international wire service.

The basic purpose of this approach to education is to supplement students' traditional learning with relevant, timely material presented by a fascinating and functional machine. Unlike special teaching machines that present programmed educational material, the teletypewriter is "for real." The material is live news in all of its unpredictable variations, from human-interest stories to explosive news "breaks." Its highly motivational characteristics make the teletypewriter a valuable instructional tool in all content areas of the curriculum. It is particularly useful as a reading machine.

Teachers who used this unconventional method in reading instruction observed that it had a number of unique qualifications as a supplement to the regular program at upper elementary and secondary levels:

1. The varied, continually-changing material transmitted from the news service satisfied the students' need for relevancy in education. The steady flow of current information stimulated their curiosity, broadened their horizons, and made them more aware of the world around them.
2. The use of the teletypewriter provided opportunities for multiple interaction. Unlike other teaching machines, it was not limited to individual usage. Students could read the teletyped copy in pairs or in small groups, with spontaneous discussions stimulated by news being relayed as fast as it happened.
3. Slow and fast readers could read teletyped material at their own rate. Slow readers who couldn't keep up with the machine's pace could follow the copy on the overflow sheet at their own speed. Fast readers could wait until a story ended, then read it as fast as they liked.
4. The teletype-news service approach helped to improve self-concepts of poor readers. The machine attracted older students and faculty members to the reading center. By sharing an interest with these persons, students felt a change in their own status. This feeling was reinforced by the opportunity to be "first" in relaying up-to-date information to parents and peers.

Teletyped copy was used successfully to developed vocabulary and comprehension skills. Vocabulary words were selected from the copy and presented for explanation and word analysis. Teachers found that students were motivated to decode words simply because they wanted to know what the machine had said.

Reinforcement was provided by frequent repetition of newsworthy words in subsequent coverage of the same event on the radio, on television, or in the newspaper.

Comprehension skills were developed according to the nature of the material. News releases were discovered to be a rich source of content for teaching such skills as identifying cause-and-effect relationships, predicting outcomes, drawing conclusions, and determining the significance of events. Main ideas were taught by having students write headlines for stories.

The teletype-news service approach also offered stimulating opportunities for language development. Simulation techniques were used in which students acted out the roles of newsmen or news makers. Oral language was practiced by tape-recording "news broadcasts," and written language skills were improved through creative writing experiences based upon the news copy.

In addition to its instructional qualifications, the teletype-news service system offered a practical advantage -- it was comparatively inexpensive. The cost of a basic system for the average school year ranged from the nine hundred to sixteen hundred dollars. This cost would be increased with the use of additional teletypewriters or of machines that produced several copies of the output. However, with the use of an opaque projector, the copy of a single machine could be projected on a screen so that a number of students could read it simultaneously. (For further information about the use of the teletypewriter, the reader may write to Mrs. Georgia Hotton, Box 582, Taos, New Mexico 87571.)

CONCLUSIONS

Innovative types of programs which as these preview some of the roles that teachers will play as technology continues to affect the course of education. Implications for the future suggest that greater flexibility and specialization will be necessary. Changes in the tools of instruction call for changes in the functions of instruction. Hence the "technological revolution" in education will

create diversified roles, such as master teacher, teacher aide, educational technologist, and programmer. Reorganization of the educational system is inevitable. However, if it is carried out with wisdom and vision, the future role of the teacher will be more challenging, more responsible, and more significant that ever before.

REFERENCES

1. Philip W. Jackson, "Technology and the Teacher," in Committee for Economic Development (CED), ed., The Schools and the Challenge of Innovation, (New York, 1969) p. 145.
2. Anthony G. Oittinger, Run Computer Run, (Cambridge, Massachusetts, 1969) p. 179.
3. Alvin Eurich, Reforming American Education, (New York, 1969) p. 114.
4. William Allen, "Audiovisual Instruction: the State of the Art," in CED, ed., p. 235.
5. Benjamine Fine, Teaching Machines, (New York, 1962) p.111.
6. Charles A. Dyer, Preparing for Computer-Assisted Instruction, (Englewood Cliffs, New Jersey, 1972) pp. 128-9.
7. Max Manley, "Administrative Problems in Cooperative Special Education Programs at Texas Technological University," published dissertation (Lubbock: Texas Technological University, 1971) pp. 15-16.
8. Ibid, p. 16.
9. "The Use of Computers for Instruction," NEA Research Bulletin, XLIX (March, 1971) p.4.
10. Stephen J. Knezevich and Glen G. Eye, eds., Instructional Technology and the School Administrator, (American Association of School Administrators, 1970) p. 64.
11. Ibid, p. 65.

12. Henry F. McCusker, Jr. and Philip H. Sorensen, "The Economics of Education," in The New Media and Education, (Chicago, 1966) p. 184.

13. Martee Wills, "Dovack's Machines Help Children Read," American Education. 7:8 (June, 1971) p. 8.

14. Thomas B. Williams, "The Development, Implementation, and Evaluation of an Interdisciplinary, Computer-based Reading Program for Disadvantaged Secondary Students Based on the Dovack Model," unpublished research (Gainesville; University of Florida, 1972) p. 25.

15. Ibid, pp. 37-38.

Jo. M. Stanchfield

Occidental College

Los Angeles, California 90041